REMARKS

Status of the Case:

The present invention provides methods for producing *in-situ* composite solders having particulate intermetallics homogenously distributed throughout the solder matrices. The composite solder is made by mixing a conventional solder with the components of the intermetallic phase, heating the mixture until it is non-solid, and rapidly cooling. The solders of this invention provide greater solder joint strength and fatigue resistance than solders among those known in the art.

In the Office Action issued June 4, 2002, all claims are rejected under 35 U.S.C. § 102 and/or 103. The rejection was made final. In this amendment, Applicants traverse all rejections, and have filed a Notice of Appeal. Applicants have also amended Claims 26, 42 and 53 to specifically address concerns raised by the Examiner. Applicants submit that the amendments present no new patentability issues, and serve to simplify further consideration of this application. Following this amendment, Claims 26-58 remain pending.

Applicants' Claims comply with 35 U.S.C. § 112, first paragraphs.

Claims 26-58 were rejected under 35 U.S.C. § 112, first paragraph. The Examiner alleges, "The expression 'two or more metals' in instant claims 26 and 42 is not supported by the specification originally filed." Applicants traverse this rejection.

Applicants submit that one of ordinary skill in the art would fully appreciate that the claimed compositions could contain two or more metals. Binary and ternary solders are described throughout the application, in particular including the disclosure on page 7, lines 21-31 of the specification. Nevertheless, Applicants have removed the "or more" language in Claims

26 and 42 to address the Examiner's concern. (Applicants note that this amendment in no way changes the scope of the subject claims, and the claims subsume binary and ternary solders.) Applicants respectfully request that the rejection under § 112, first paragraph, be withdrawn.

Applicants' Invention is Novel.

The Examiner rejected Claims 26-30, 33-36, 38-48 and 50-58 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 5,527,628, Anderson et al., issued June 18, 1996. The Examiner states, "The Anderson et al. reference(s) disclose(s) the features [of Applicants' invention] including steps of combining a solder with the components of the intermetallic phases such as Cu and Ag to form a mixture (Col. 5, line 59 to Col. 6, line 12)." Applicants respectfully traverse this rejection.

Applicants respectfully submit that the Examiner has misunderstood *Anderson*. In particular, *Anderson* does not teach the steps of combining a solder with the components of an intermetallic phase. The intermetallic compounds distributed in the *Anderson* solder are formed from the solder matrix itself, rather than being added to the matrix in a separate processing step. Applicants' invention, on the other hand, starts with a solder such as that disclosed in *Anderson*. The components of the intermetallic phase are then added to the solder. The composition is then processed in such a way as to create a fine dispersion of the intermetallic components within the solder matrix.

Thus, the intermetallic phase of Applicants' solders are added to, rather than made from, the solder matrix. This distinction is clear in the claims. Claims 26, 42 and 53 provide distinct steps of providing a matrix solid, and then heating that solder with the intermetallic component to form a mixture. *Anderson* does not describe or suggest such discrete steps. Rather, as quoted

by the Examiner, *Anderson* simply describes a process for forming the solder itself. There is no discussion or suggestion of adding a separate intermetallic to the solder once it is formed. Moreover, *Anderson* fails to disclose a process where the solder is melted, cooled, re-melted, and then rapidly cooled, such as in Applicants' Claim 42.

In the Office Action, the Examiner further states, "Applicants argue that Anderson fails to mix an already formed intermetallic compound with a solder." Applicants respectfully submits that the Examiner has misunderstood Applicants' argument. Applicants have not asserted that the present invention relates to the mixing of a "already formed intermetallic component." Rather, the key point is that the present invention uses an already formed solder, to which an intermetallic component is added. This is not taught or suggested by *Anderson*. To further clarify this, and address the Examiner's concerns, the "components of" language has been removed from Claims 26, 42 and 53. While this in no way changes the scope of the claims, Applicants make this amendment to make clear that it is not the nature of the intermetallic component which is important to this invention. Rather, it is the addition of the intermetallic to the solder that is a key distinction over *Anderson*.

Applicants' Invention is also Non-obvious.

Furthermore, *Anderson* in no way suggest that Applicants' invention, and thus does not render it obvious. *Anderson* focuses on a novel ternary eutectic solder as having alleged preferred characteristics. *Anderson* describes his solder as a "heretofore unknown ternary eutectic composition consisting essentially of about 93.6 weight % Sn - about 4.7 weight % Ag - about 1.7 weight % Cu having a eutectic melting temperature of about 217°C and variants of the ternary eutectic composition. (*Anderson*, at Col. 2, lines 44-46, emphasis added)." The

composition of the *Anderson* solder is very specific, as evidenced by the "consisting essentially of" language. One of ordinary skill in the art would not expect modifications of the *Anderson* solder to be preferred. Thus, *Anderson* teaches away from modification of its disclosed "novel" eutectic solder, and does not render obvious the present invention.

Claims 37 and 49 were also rejected under 35 U.S.C. § 103 as being obvious over *Anderson* in view of Gibson, et al., Des. Reliab. Solder Interconnect., Proc. Symp. (1997). Applicants respectfully traverse this rejection, for the reasons discussed above regarding *Anderson*. *Gibson* provides no disclosure of the processes of Applicants' invention, of adding an intermetallic to an already formed solder matrix. Accordingly, *Gibson* does not remedy the deficiencies of the *Anderson* reference. The combination of these references does not render Claims 37 and 49 obvious.

The Examiner also rejected Claims 31 and 32 under 35 U.S.C. § 103 as being obvious from *Anderson* in view of U.S. Patent 5,520,752, Lucey, Jr. et al., issued May 28, 1996. Applicants' respectfully traverse this rejection. *Lucey* makes no disclosure of the methods of the present invention, and does not suggest adding the components of an intermetallic to an already formed solder matrix. Accordingly, *Lucey* does nothing to remedy the deficiency of the *Anderson* reference, and the combination does not render Claims 31 and 32 obvious.

CONCLUSION

Applicants submit that the claims comply with the provisions of 35 U.S.C. § 112, first paragraph, and define novel and non-obvious subject matter. Applicants therefore request withdrawal of the rejections of record, and allowance of all claims.

Respectfully submitted,

Dated: 4 September 2002

By: _____
David L. Suter
Reg. No. 30,692

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1600